

greatly increased with high temperatures and correspondingly retarded with low temperatures. Photographic films, negatives, and prints deteriorate rapidly under certain climatic conditions, and are preserved indefinitely under other favorable conditions.

Man can endure a high degree of humidity or a high temperature without distress, but there seems to be a combination of the two that is peculiarly inimical to human comfort and well-being. The same is true of photographic films and prints, which may be subjected either to high temperatures or high humidity without excessive deterioration, *but not to both in combination.*

Both prints and films deteriorate rapidly in the moist Tropics, due to the combined effects of high temperatures and high humidity. The writer has known an undeveloped exposed film to be ruined from mildew *in five days' time in the Tropics*, whereas in the Temperate Zone an exposed film was carried in the writer's camera for five months in the West (Oregon), six months in the East (New York), and six months in the Ohio Valley before being developed. *Even then it was only slightly damaged from mildew.*

Photographic prints, too, lose their permanence in the Tropics. Rarely will good professional prints withstand two years' exposure to moist tropical conditions without serious damage. It is therefore unsafe to take valuable photographic prints to the Tropics and allow them to remain for any considerable time. However, prints *developed and fixed* under tropical conditions have a much greater permanence in the Tropics than prints developed and printed in the Temperate Zone and subsequently taken to the Tropics.

CONCLUSION.

From what precedes it will be seen that climatic conditions powerfully influence photographic work. The writer has observed much photographic work spoiled or improperly done because the operator was working out of his accustomed climatic environment. A successful camera man should have at least a fair knowledge of climatology and meteorology. In concluding, suitable advice to photographers would be "Know your camera, lens, and shutter, and know also the climatic conditions under which it operates."

ANOMALOUS STORM TRACKS.

By EDWARD H. BOWIE, Meteorologist.

[Weather Bureau, Washington, D. C., April 1, 1922.]

There are to be found in the meteorological textbooks statements to the effect that cyclones are carried along in the general air currents that are assumed to prevail over the region occupied by the cyclone on any particular date; that these general air currents are subject to seasonal changes; and that the tracks of cyclones are subjected to corresponding changes in both the speed and direction of progression. It is in the main true that in the Tropics the cyclones on the first branches of their tracks move west or northwest and that extratropical cyclones move toward the east or northeast. But if individual cyclone tracks are considered, it will be found that the general rule is very often departed from; that cyclones of the extratropical regions often follow very irregular courses; and that marked variations in the speed of progression are not uncommon. Also, that the tracks of tropical cyclones are not symmetrical and like unto parabolas, as stated in the textbooks. It would simplify the work of the forecasters if cyclones, both tropical and extratropical, would behave in an orderly manner, but unfortunately they do not.

Why, after a cyclone has formed and started on its course, it does not pursue an even and orderly course from its birth to its disappearance is a matter not yet solved, but it must be inferred that in some cases, at least, fundamental changes in environment are encountered which cause these perturbations.

Figure 1 shows the path of five exceptionally erratic cyclones. One of these, that of April, 1903, had its origin over the Carolinas and described a loop over the vicinity of Chesapeake Bay; another, that of April, 1910, formed over Arkansas, moved northward to Wisconsin, where it described a loop and finally disappeared over Lake Erie; and another of the same month and year originated over Kansas, moved east-northeastward to the vicinity of Lake Michigan, where it described a loop and then moved southward and finally disappeared over Georgia; another, that of June, 1916, formed over New Mexico, followed what may be regarded as a normal course until it reached the vicinity of Lake Michigan, where it described a loop in its track and after doing so

moved eastward in an orderly manner and finally disappeared off the north Atlantic coast. These storms were all of extratropical origin, but in all instances were well defined, and there is little or no doubt as to the accuracy of the charted positions of their centers. There is also indicated on this chart the track of a West Indian hurricane of October, 1910. It formed over the Caribbean Sea, moved north-northwestward, crossed the western end of Cuba, and in that region the center described a loop and after doing so passed north-northeastward in a normal course. As there had been considerable doubt as to the track this hurricane actually followed, it was recently made the subject of a special study, all available data from land observatories and vessels in that region being used in preparing the daily synoptic charts, by the Observatorio Nacional, Casa Blanca, Habana, Cuba, and later by the Weather Bureau, Washington, D. C. The independent studies were in agreement and to the effect that the track followed was essentially that shown on the chart.

The study at Habana of the hurricane of October, 1910, was made by Dr. José Carlo Millás, Director, Observatorio Nacional, assisted by Dr. Carlos Theye, Mr. Manuel Maria Garcia Blanco, and Mr. Miguel Gutierrez. Dr. Millás, in a recent letter to the Chief of the Weather Bureau concerning this study, wrote as follows:

The following hypotheses have been studied in the effort to explain the bad weather during five days of October, 1910, in the western part of Cuba:

1. Elliptical form of cyclone.
2. Inclination of the axis.
3. Loop.
4. Bell-shaped parabola.
5. Point d'arrêt.
6. Two cyclones.

1. The elliptical form of cycloae, the inclination of the axis, the bell-shaped parabola, and the point d'arrêt can not explain the observed phenomena.

2. The hypothesis of two cyclones has been also rejected for the following reasons:

(a) Due to theoretical reasons, two hurricanes of considerable intensity can not coexist in such close proximity.

